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TECHNOLOGY December 6, 1952

VOL. 62, NO. 23 PAGES 353-369

SCIENCE NEWS LETTER

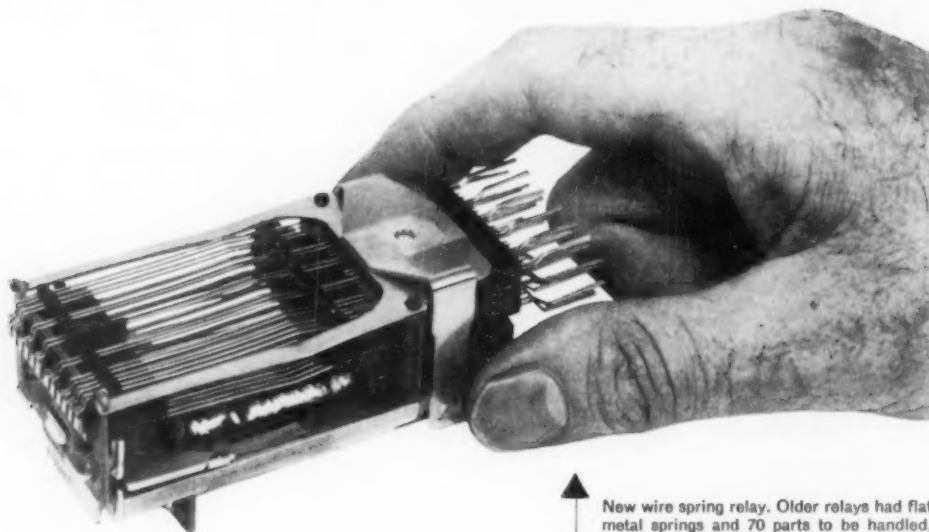
THE WEEKLY SUMMARY OF CURRENT SCIENCE

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DETROIT

Eye-Deceiving
See Page 362

A SCIENCE SERVICE PUBLICATION

It splits seconds even faster

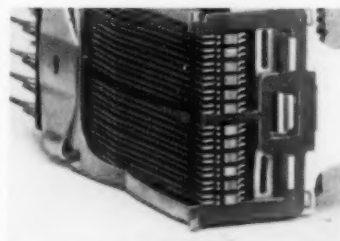


IN A split second, relays, which are high-speed switches, set up dial telephone connections. Then they are off to direct the next call. Yet even this speed is too slow for Bell Laboratories scientists in quest of still faster switching.

Scientists and engineers devised a new relay — the wire spring relay — and worked out the production problem with Western Electric, manufacturing unit of the Bell System. This is twice as fast, uses less power and costs less to make and maintain.

With speedier relays, switching can be done with less equipment . . . and calls go through faster. The wire spring relay is a practical example of how Bell Telephone Laboratories and Western Electric pool their skills to improve telephone service while keeping its cost down.

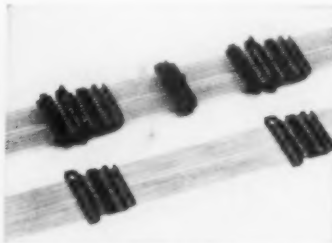
New wire spring relay. Older relays had flat metal springs and 70 parts to be handled, compared with 12 in the new model. Relays operate by means of an electromagnet which responds to high-speed pulses.



New relays must be able to operate one billion times—equal to once-a-second for 30 years. Employing a sound recorder as a precision vibrator, Bell scientists learned to evaluate the effect of sideways motion on relay life. Such rubbing motion is limited to one-thousandth of an inch in the new relays.



Dynamic Fluxmeter, developed by Bell Telephone Laboratories, indicates flux build-up in intervals of 25 millionths of a second. Precise information like this was essential to higher speed operation.



Relay springs as they come from Western Electric molding machine, before being cut apart for use. Molding technique saves time and money . . . makes possible the maintenance of relays in precision adjustment.

Bell Telephone Laboratories



Improving telephone service for America provides careers for creative men in scientific and technical fields.

BIOCHEMISTRY

Energy of Photosynthesis

Clue as to how the energy of the sun is channeled into the "blood stream" of plants is found in protogen molecules, recently discovered plant growth stimulant.

► AN UNDERSTANDING of the key question of photosynthesis, nature's process of manufacturing the world's energy foods in green plants, may have been found.

It was reported by Dr. Melvin Calvin, University of California chemist, in the annual Harrison Howe Lecture of the Rochester, N. Y., section of the American Chemical Society.

In photosynthesis, green plants capture light energy from the sun and, with carbon dioxide and water, form the energy substances basic to life on earth—proteins, carbohydrates, fats, sugars, etc.

While studies by Dr. Calvin and many others with radioactive carbon have yielded the answers to many of the secrets on the "synthesis" side of the process, the most important question of all, in the "photo" phase, has baffled generations of scientists.

The question is this: how is the sun's energy channeled into the chemical "blood stream" of plants?

Scientists have known that the chlorophyll, the green pigment of plants, initially captures the sun's energy. This happens when quanta, or packets, of energy from the sun set electrons of the chlorophyll into faster motion. Energy is stored temporarily in the increased motion of the electrons.

But this energy can remain in the chlorophyll for only a few thousandths of a second at most. The question is how the energy gets from the chlorophyll into the plant chemistry.

Dr. Calvin told the assembled chemists that he obtained a clue in a prosaic manner. He had received samples of protogen, a recently discovered growth stimulant found widely in plants.

One sample was the natural chemical found in plants. The other was a closely related synthetic material. Chemically they are essentially the same, with but slight differences in the arrangements of the atoms in the molecules.

Dr. Calvin's examination showed that the natural form of protogen was yellowish, while the synthetic product was colorless. This suggested to him a peculiar arrangement of the two sulfur atoms in the natural protogen, which is known as a disulfide.

In this arrangement the two sulfur atoms would be bound together in a small ring, and the bond could be easily split by quanta of energy from outside the molecule. Dr. Calvin synthesized the main section of the molecule and found his speculation was true.

Dr. Calvin's theory, then, is essentially

this: The protogen molecules are in contact with the plastids, the plant units that contain chlorophyll. Energy packets emerging from chlorophyll strike the protogen molecule, breaking the susceptible bond tying the two sulfur atoms together. The energy is retained in the two resulting molecular fragments, which can easily combine with other molecules in the rapid transitions that build energy-bearing proteins and other substances. Thus the energy is stored in the plant.

Dr. Calvin was cautious in his report. He said his evidence, though strong, is not conclusive, and that further work will be required to prove it.

If this work justifies the theory, the greatest hurdle of all to man's understanding of the process which keeps him alive will have been cleared.

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GENETICS

Heredity Seen as Key To Fat-Use Disorders

► HEREDITY, RATHER than diet or occupation or housing, may be what determines whether or not a person is likely to develop disorders of fat utilization, in-

cluding early fatty degeneration of the arteries leading to a serious form of hardening of the arteries and heart trouble.

If this is the case, the hereditary transmission seems to be through a dominant gene with incomplete penetrance.

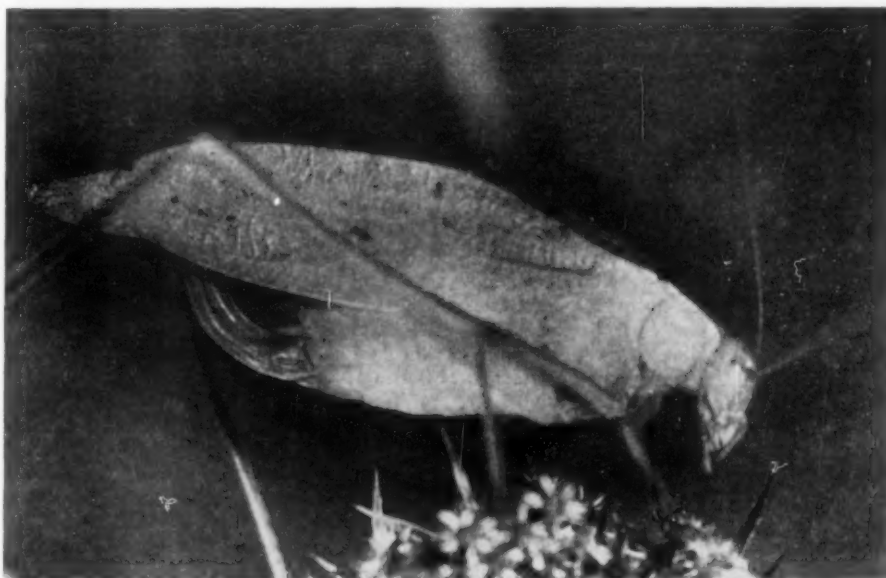
Studies showing this were reported by Drs. David Adlersberg, Louis E. Schaefer, Stanley R. Drachman and Arthur C. Steinberg of Mount Sinai Hospital, New York, to the American Institute of Biological Sciences.

Because of earlier research showing that faulty utilization of the fatty substance, cholesterol, might be "a common denominator" for most patients with early fatty degeneration of the heart's arteries, these scientists investigated patients who had a high level of cholesterol in their blood. Included in the investigation was a study of as many of the patients' relatives as possible, to determine the hereditary pattern of this condition.

Among other things, the scientists found that a high percentage of brothers, sisters and children of the patients also had high blood cholesterol levels, even though these sisters and brothers did not show any signs of sickness due to faulty fat utilization. This faulty fat utilization, showing up in too much cholesterol in the blood, occurs more often among Jews than non-Jews, but is as frequent among brothers, sisters and children of non-Jewish as of Jewish patients. This latter finding lends strength to the theory that the condition is genetically determined.

The conclusions are considered tentative and the study should, the scientists state, be extended to a larger and more representative population group.

Science News Letter, December 6, 1952



PINK FALSE KATYDID—This rare pink form of the false katydid, *Amblycorypha oblongifolia*, found near Wyandotte, Mich., by Walter P. Nickell, has milky-white eyes and white antennae. Normally, these insects are grass-green in color, with light brown eyes and antennae.

GENERAL SCIENCE

Information Exchange

Republican control of Joint Committee on Atomic Energy expected to reduce chances of exchange of secret atomic information with British scientists.

►BRITISH AND American atomic experts who hope to exchange secret information and knowledge had better give up that hope, for a while at least. The new Republican-controlled Joint Committee on Atomic Energy is not likely to take kindly to that idea.

Nor will it be very friendly to the suggestions of Gens. Omar Bradley and J. Lawton Collins that NATO forces in Europe be given some information about the capabilities of atomic weapons. The two generals think this is necessary for proper planning of the defense of Europe.

The new committee will be headed by either Sen. Bourke B. Hickenlooper, R-Iowa, or Rep. W. Sterling Cole, R-N.Y. Sen. Hickenlooper was chairman once before, in the Republican-controlled 80th Congress. Now House members of the joint committee are claiming it is their turn to provide the chairman.

One big decision the committee will have to make is the manner in which the first practicable plants for producing power from atomic energy are financed. There are three proposed methods: 1. The government would subsidize private industry by guaranteeing to buy the plutonium produced as a by-product to the power. 2. Private industry would go ahead without this subsidy. 3. The government would build a plant itself.

The third solution is probably out. A Republican administration is unlikely to

sponsor an atomic TVA. There is disagreement within industry about whether or not a subsidy is a good thing.

The committee will have a great deal to say about the extent of the H-bomb program. Shortly before he died, Sen. Brien McMahon, father of the Atomic Energy Act, spoke of building "thousands" of H-bombs. The committee will have the last say as to whether this is a worthwhile investment.

There will probably be little change in the thinking of the committee on the amount of money to be made available for the atomic program. But the Appropriations Committees of the House and Senate have something to say about that. With Rep. John Taber, R-N.Y., heading the House group, there is some fear that appropriations might be cut below that point which the atomic committee members think necessary.

What stands in greatest danger of being cut are the Atomic Energy Commission's programs of basic research and fellowships for advanced study. Some Congressmen believe that greater emphasis should be given to applied research and development based on what we already know during the time of danger to the nation. The scientists and other Congressmen believe we might lose the scientific cold war if we do not constantly search for new fundamental knowledge.

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PSYCHOLOGY

"Not Quite" Age

►THE ADOLESCENT age, from 12 to 18, has been called the "not quite" age by one psychiatrist, Dr. L. G. Lowrey of New York. It is an age when boys and girls are "not quite" children, "not quite" adults and "not quite" sure of themselves.

It is an age calling for great understanding on the part of parents, teachers and other grownups, particularly when in positions of authority over the adolescents.

Parents and teachers must understand not only the adolescents but also themselves. For example: Bill has taken driving lessons and wants to drive the family car. Dad says, No, he is still too young. Does Dad understand that his own needs and Bill's are in conflict? Bill may need to exercise his sense of accomplishment by showing how well he can handle the family car. Dad needs to express his sense of ownership and his "vast practical ex-

perience." If Dad can understand his own needs and feelings as well as Bill's, he and Bill should be able to work out the situation in a reasonable way without a fight or hurt feelings.

Dr. C. Douglas Darling of Cornell University explains some of the "rigidity and bossiness on the part of parents, college professors, doctors and teachers" as follows: It is due to the fact that for some unconscious reason these people are afraid they will be displaced in some way by the youth who seems to be taking such authority to himself.

In the first issue of a new magazine, *Student Medicine* (Oct.), Dr. Darling also warns that parents and other adults should not make fun of the adolescent's awkwardness nor of his "puppy" love affairs. These last, he points out, may be just as deep as love relationships in later life, even if

the "puppy" love affairs are not quite so long-lasting.

Adolescents, Dr. Darling also says, should occasionally be allowed to fail or make mistakes without being punished or blamed.

"We learn from our failures, not from our successes," he points out.

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Electronic computers cannot solve problems that cannot be solved by "hand methods"; their superiority lies only in their speed, accuracy and ability to grind away at the problem without tiring.

SCIENCE NEWS LETTER

VOL. 62 DECEMBER, 6, 1952 No. 23

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N. St., N. W., Washington 6, D. C., NORTH 2255. Edited by WATSON DAVIS.

Subscription rates: 1 yr., \$5.50; 2 yrs., \$10.00; 3 yrs., \$14.50; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

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Printed in U. S. A. Entered as second class matter at the post office at Washington, D. C., under the act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for by Sec. 3440, P. L. and R., 1948 Edition, paragraph (d) (act of February 28, 1925; 39 U. S. Code 283), authorized February 28, 1950. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature, Abridged Guide, and the Engineering Index.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N.Y.C., Pennsylvania 6-5566, and 350 N. Michigan Ave., Chicago, State 2-4822.

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MEDICINE

Steps to MS Solution

One of the latest clues for solving the problem of multiple sclerosis patients is the finding that their blood contains more cyanide than that of normal persons.

► SCIENTISTS ARE making progress in attempts to solve the problem of multiple sclerosis. This disease, known as MS for short, afflicts more than a quarter of a million Americans. Most victims are between the ages of 20 and 45.

New ways of bringing temporary relief, at least, new knowledge of body chemical differences between MS patients and others, and a potential new early diagnostic test are brightening the dreary MS situation. Best of all, perhaps, doctors and medical researchers have fresh interest in the patients and the disease.

At the National Institutes of Health of the U. S. Public Health Service, scientists heard about one of the latest clues for solving the MS problem. This is the discovery that the blood of patients with MS and certain similar nerve diseases contains more cyanide than that of normal persons. The amount of this poison in MS blood is about one-tenth the quantity which is sometimes fatal. It is about the same as that which causes symptoms like those of MS in healthy people who, in one way or another, absorb unusually large quantities of cyanide.

Along with this discovery came the finding that the chemical, thiosulfate, causes the cyanide to disappear from MS patients' blood within about two minutes. In about 48 hours the cyanide could again be detected.

Whether this harmless chemical, a known detoxifying substance for cyanide, can be used in treatment of MS patients is for future study to determine.

Meanwhile, some patients are getting temporary relief of symptoms, particularly in the acute stage of the disease, from chemicals that dilate blood vessels. Among these are tetraethylammonium chloride, amyl nitrite, nicotinic acid and carbon dioxide. None of these is considered in any sense a cure, however.

Because multiple sclerosis attacks at an early age and almost totally disables many of its victims before it kills, usually by age 45, it is an economic problem as well as a personal tragedy.

The disabilities come through seeing double, tremor, weakness, difficulty in walking and balancing, difficulty in talking, bladder trouble and emotional disturbances.

All these result because the fatty sheath of various nerves is gradually damaged and scarred. The scarred nerves cannot function efficiently and eventually may fail completely to transmit impulses. The patient's troubles depend on which nerves are affected and how severely.

Symptoms may come and go, especially in the early stages. During the intervals, or remissions, the patient may feel quite well, and these remissions may be fairly long. They make it hard to tell whether a new medicine is helping.

Although the disease is a nerve disease, many scientists are studying the blood of MS patients in the hope of getting clues to the disorder. Such studies led to the cyanide discovery described by Dr. Richard C. Fowler of the University of Rochester, N. Y., School of Medicine. They have also shown other scientists that the blood of MS patients clots more slowly than normal in most cases, that it contains more of the fatty chemical, cholesterol, and that it sludges. This sludging, or packing of red cells in the blood vessels, might play a part in causing the disease, Drs. L. Roizin, R. Abel and F. Winn of New York believe, because it might deprive nerve cells of oxygen.

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TECHNOLOGY

Floating Truck Lands Combat-Ready Tank

► WATER, beach sands and rough terrain behind the beaches are all navigated with equal ease by a new 60-ton, amphibious cargo vehicle of the U. S. Army. (See SNL, Nov. 22, p. 327.)

Resembling a scow in general appearances, it is equipped with rubber-tired wheels, measuring ten feet in diameter, for traveling on land and twin screw propellers for propulsion in water.

In a demonstration at Fort Lawton, Wash., the huge cargo carrier was loaded at shipside with a medium tank. It transported the tank ashore through the water, over a soft beach and unloaded it inland ready for immediate combat action. The new amphibian has a specially designed landing-craft type of ramp that permits a loaded tank to leave the vehicle under its own power and fully ready for combat.

This amphibious vehicle, called the "Barc," is 61 feet in length, 27.5 feet in width and has a height of 16 feet. It is powered with four 165-horsepower diesel engines, one to drive each wheel. The same engines are used to drive the propellers when the craft is afloat. Two engines power each of the two propellers. Easy maneuvering, on land or water, is emphasized as a characteristic of the new amphibian.

Science News Letter, December 6, 1952



DR. EDWIN G. CONKLIN—Henry Fairfield Osborn Professor Emeritus at Princeton University and world-famous biologist, Dr. Conklin died at his home in Princeton Nov. 21.

NECROLOGY

Dr. Conklin Asked Science To Fight for Peace

► THE SCIENCE of biology lost one of its "grand old men" with the death of Dr. Edwin Grant Conklin, 88, professor emeritus of biology at Princeton University and world-famous for his studies on animal development. Dr. Conklin died Friday, Nov. 21, at his Princeton home, three days before he would have reached the age of 89.

Dr. Conklin had been a member of the board of trustees of SCIENCE SERVICE since 1937 and was its third president over a span of years.

His death marked the end of 61 years of teaching and research. Although he retired from active teaching in 1933, at the age of 70, Dr. Conklin continued working, lecturing and writing until the last. During his 19 years of "retirement," Dr. Conklin turned out 95 articles and three books on biology and the light it sheds on the problems of the human race. Until his last illness, Dr. Conklin worked with a microscope nearly every day on his research.

His most famous contribution to biological knowledge was the demonstration that the future organs of a body could be located in definite sections of a fertilized one-celled egg and in the earliest embryos.

Dr. Conklin could never be accused of being an "ivory tower" scientist. He wrote and spoke constantly about the great problems of the day and the application of science, particularly biology, to them. Before the outbreak of World War II, Dr.

Conklin told a group of British scientists that civilization faced a crisis brought on by the rapid advancement of science and the stagnation of society. He warned that society would react to this situation by the violence of revolution if scientists and the world's leaders did not act to bring about social advancement by the calm, reasonable means of evolution.

When the war he prophesied appeared, Dr. Conklin turned his scientific knowledge to blasting the racist theories of Hitler. Intolerance, bigotry and prejudice are man-made, he said, appealing for the use of reason and the scientific spirit.

Concerning the world of tomorrow, Dr. Conklin wrote in his book, "Man, Real and Ideal," published during the war, that men should fight together for society in peacetime as they fight together to preserve their society in war.

"Why should not the service of society be the supreme duty in time of peace?" Dr. Conklin asked.

Theory is no good unless backed by fact, Dr. Conklin had learned from his work as a scientist. And so he warned the planners of the future:

"To be of any real effect, ideals must lead to action. Faith that will move mountains must be put to work with steam shovels."

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ENGINEERING

No Quick Solution Seen To Air Pollution Problem

► NO QUICK solution to annoying air-pollution problems was foreseen by Allen D. Brandt of the Bethlehem Steel Co. at a meeting of the American Society of Mechanical Engineers in New York.

"A certain amount of air pollution is the price that must be paid for those many conveniences which are the product of an industrial giant (the United States), and this condition requires a long time to correct," he said.

About \$100,000,000 already is being poured annually into corrective measures to make the air less contaminated. Effects of the control measures are beginning to show. Despite increased employment and production, air pollution due to dust and sulfur dioxide is on the downgrade.

Industries are cutting air pollution by substituting machines that release few objectionable contaminants into the air for machines that expel many air-pollutants.

Other industries are converting their wastes into by-products. Horrible-smelling hydrogen sulfide can be converted into sulfur dioxide, and that can be made into sulfuric acid. Poisonous carbon monoxide can be burned into harmless carbon dioxide.

Still other industries are filtering the solid polluting products out of waste gases by machinery, or are building tall smokestacks that will disperse waste gases high into the atmosphere where they will not be objectionable.

Science News Letter, December 6, 1952

PHYSICS

Eventful Atomic Decade

Dec. 2, 1942, the date of first self-sustaining nuclear chain reaction, marked beginning of new era in history. In closing weeks of first decade, H-bomb presumably was exploded.

► TEN YEARS ago the first atomic "fire" was "kindled" in an old squash court at Stagg Field, University of Chicago. Dec. 2, 1942, was the date of the first self-sustaining nuclear chain reaction in the history of the world, an event ranking with man's first prehistoric lighting of a fire.

In this event-packed decade, the atomic bomb was developed in the most intensive and expensive research project of history.

Nearly 40 atomic bombs have been exploded, two of them to cause Japan's precipitate surrender.

Perhaps 30 nuclear reactors (atomic piles or "furnaces") of various varieties are operating, most of them in the United States, but some also in Canada, Britain, France, Norway and, presumably, Russia.

A stockpile of perhaps 500, perhaps 1,000, atomic bombs has been built up in the United States, with their plutonium more precious and more closely guarded than the gold of Fort Knox.

Soviet Russia is known to have exploded three atomic bombs. The balance of world power may rest with the size of the Soviet A-bomb stockpile.

The first "hydrogen" bomb presumably was exploded in the closing months of atomic energy's first decade. This "thermonuclear" H-bomb weapon is potentially perhaps a thousand times as powerful as the city-devastating A-bomb.

Two atomic engines for submarines, one for an aircraft carrier and two for airplanes are under development.

Study Photosynthesis Secret

Many new artificially radioactive elements have been created in nuclear reactors. Over a score of radioisotopes are in production and use in medicine and research. Cobalt 60 alone produces many times more gamma radiation for cancer treatment and other use than all the world's radium. If the secret of photosynthesis is discovered through use of radioisotopes, it will be worth more than the whole atomic energy development.

Industrial and commercial use of atomic power has been postponed by emphasis in the U. S. Atomic Energy Commission program upon weapon and military application. But there is the eventual possibility that out of a slowed down H-bomb reaction there will come power cheaper than from oil and coal, without use of scarce and expensive uranium.

So far for atomic energy the United States has spent \$12,046,000,000 and the rate is now about \$3,000,000,000 a year.

What happens in a nuclear reactor or an atomic bomb is that matter is converted into energy.

Einstein's special theory of relativity in 1905 showed the equivalence of mass (matter) and energy, the famous formula being E equals m (mass) times the square of c , which is the velocity of light. Long before that first reactor in 1942, scientists had thus figured out that the obtaining of energy from matter should be possible. They had proved it in various experiments.

The war-inspired supersecret atomic energy program got under way in great earnest in 1940. Its first great step was the successful operation of the historic first self-sustaining chain-reacting pile. Although the date was Dec. 2, 1942, the date line of the news about this event was Aug. 10, 1945, when the famous Smyth report (written by the same Dr. H. D. Smyth now an AEC commissioner) was released. Just a few days earlier the world had learned of the use of the first two atomic bombs in war.

First Pile Built Slowly

It was a dramatic time when that first reactor "went critical," that is, achieved a chain reaction that kept producing energy without outside aid. About six tons of uranium and uranium oxide were used, all that could be scraped together. There was purified graphite to moderate, or slow down, the reaction. The pile was built as a lattice, with the lumps of metal or oxide regularly spaced through the graphite. Movable strips of absorbing materials served as controls. Slowly the pile was built, with many instruments monitoring what happened. Earlier than anticipated, the reaction started. Controlled atom-fissioning or splitting was a reality.

Leaders of this 1942 experiment, Dr. Enrico Fermi, scientific refugee from Mussolini's Italy in charge of the experiment, Dr. A. H. Compton, now chancellor of Washington University, Dr. E. P. Wigner of Princeton University, and Dr. W. H. Zinn of Argonne National Laboratory, are all still associated in some way with the atomic energy program. They had a reunion meeting at the St. Louis meeting of the American Physical Society on Friday, Nov. 28.

The story of the release of atomic energy really begins with many discoveries, experiments and theories in nuclear physics in the 1930's. But the immediate start of the researches which resulted so spectacularly was in December, 1938, when two Germans, O. Hahn (awarded the Nobel



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prize in 1945) and F. Strassmann, proved that an isotope of barium was produced by neutron bombardment of uranium. The neutron is a fundamental particle of matter without electrical charge and with a mass about equal to that of the proton or nucleus of the hydrogen atom.

Two refugees from Germany, O. R. Frisch and Lise Meitner, suggested that the absorption of a neutron by a uranium nucleus sometimes caused that nucleus to split into approximately equal parts, with the conversion of some of the mass, by Einstein's 1905 formulation, into enormous quantities of energy, a process called fission.

Experimental confirmation of uranium fission in several laboratories followed. The suggested likelihood of emission of neutrons in the process was demonstrated. This indicated the possibility of a chain reaction releasing energy explosively, the neutrons produced splitting asunder other uranium atoms and producing more neutrons as well as energy.

The world's common sources of power,

other than sunlight and water power, are chemical reactions, such as the combustion of oil and coal. They release energy as the result of rearrangements in the outer electronic structures of the atoms. This is the same kind of process that supplies energy to the living body.

Combustion is self-propagating. A match releases enough heat to ignite the neighboring fuel, which in turn releases more heat which ignites more fuel. Similarly, nuclear reactions may emit particles of the same sort that initiate them, and they may be sufficient in number to propagate the reaction in neighboring nuclei. This is called a chain reaction, and it is this sort of reaction accompanied by release of energy that occurs in the atomic bomb.

By June, 1940, it was known that slow neutrons caused fission in one isotope, uranium 235, but not in the other, uranium 238. It was known that the average number of neutrons emitted per fission was between one and three. A chain reaction had not been achieved but its possibility was clear.

It was found necessary to separate uranium 235 (less than $\frac{1}{2}\%$ in any uranium sample) from the more abundant isotope 238 (more than 99%). An enormous isotope separation plant, using gaseous diffusion methods, was erected at Oak Ridge, Tenn.

Two new elements, heavier than uranium 92, both of which were "made to order," played an important part in the atomic bomb researches and manufacture. These were elements 93 and 94.

Element 94 is formed from uranium 238 by neutron capture. This element undergoes slow neutron fission like uranium 235.

Plutonium was obtained from uranium 238 by way of the intermediate shortlived element 93, named neptunium.

Manufacture of plutonium from uranium 238 allowed utilization of the inert uranium isotope for atomic power purposes. It allowed the advantage of sharp chemical separation of different elements instead of the tedious diffusion methods of isotope separation. Plutonium is probably the A-bomb material of today.

Thus transmutation, for centuries the alchemists' goal, became the method of choice of the group of scientists who worked out the chemistry of the atomic bomb.

The great nuclear reactors at Hanford, Wash., manufacture plutonium from uranium by this process.

Fusion for H-Bomb Reaction

The reaction of the hydrogen bomb is different from that of the fission bomb. The thermonuclear reaction involves the conversion of hydrogen into helium with a release of energy due to loss of mass. This is called fusion. This may be the kind of reaction that keeps the sun stoked.

The most likely kind of hydrogen for use in the H-bomb is the triple weight variety or isotope, tritium. It can be produced in a nuclear reactor such as those at Hanford by neutron bombardment of lithium metal. Deuterium, or double-weight or heavy hydrogen, possibly may fuse also.

The starting trigger of the H-bomb would be a plutonium bomb, the A-bomb, whose sun-like high heat brings about the fusion.

Nuclear reactors are thus prime instruments of the atomic age. The original one, called CP-1, has long since been removed from its athletic field cradle. The AEC admits it has 23 reactors, aside from the power ones being built for military purposes and the unrevealed ones at Hanford, where the official count is four, and at the new Savannah River H-bomb plant now building.

Out of the reactors come the stuff of bombs, exploding atoms that cure, and new knowledge about the way the universe is put together. If men can refrain from destroying the world with the atoms they have harnessed, Dec. 2, 1942, will be a great day in history.

Science News Letter, December 6, 1952

ZOOLOGY

Cultivate Bacteria-Free Variety of Vinegar Eel

► EVER HEAR the phrase "as sour on life as a vinegar eel?"

Well, the vinegar eel leads a very wholesome life even though it resides in vinegar barrels and thrives on a diet of vinegar and bacteria, Dr. Clark Read and H. A. Ellis of the University of California at Los Angeles have found.

They have been able to cultivate a bacteria-free variety. This is considered quite an accomplishment among zoologists, because the vinegar eel is a relatively highly organized animal and bacteria-free animals are rare even among most simple one-celled animals. The bacteria-free vinegar eel is providing an excellent medium for nutritional studies. This "eel" is really a worm, not a fish like those in the sea and rivers.

If you think the vinegar eel is eccentric, you should consider its cousin, "the felt beer mat eel," Dr. Read says. It apparently exists only in the brew-soaked felt mats which Germans customarily use as coasters for their steins.

It also has a couple of peculiar relatives that prefer climatic extremes. One lives only in hot springs such as you find in Yellowstone Park. The other exists only in the ice fields of Spitzbergen.

They are all a part of a worm group known as *Nematodes*. The black sheep of the usually harmless clan is the hookworm that wreaks havoc with man and animal.

Science News Letter, December 6, 1952

ELECTRONICS

Tracking System Checks Ship's Speed Secretly

► NAVAL ENGINEERS secretly determined the "ground speed" of the shiny new superliner S. S. United States through a modified electronic tracking system used previously to follow the wanderings of high-flying weather balloons.

Reporting to the Society of Naval Architects and Marine Engineers meeting in New York, J. P. Comstock, assistant naval architect at the Newport News Shipbuilding and Dry Dock Co., and C. E. Hastings, president of the Hastings Instrument Co., Newport News, Va., said the system prevents unauthorized persons from figuring out the ship's speed during tests.

Extremely accurate, the system replaces the "measured-mile" course over which ships usually are clocked during speed tests. Only two such courses are widely used on the eastern coasts of North America and Cuba. Neither was satisfactory as a test site for the United States.

The Raydist system, as it is called, has these advantages over the measured-mile course:

It can be used in "truly deep" water, whereas the measured-mile course must be visible from the shore.

The speed measurement remains secret. That is, the ship's speed cannot be figured out by unauthorized persons.

It is not restricted to daylight operation, or limited by poor visibility.

It permits the ship to maneuver more easily, especially when turning and when building up speed for the test run.

It permits runs to be made into, across, or with the wind as desired.

Basically the system consists of a transmitter aboard the vessel to be tested and a receiver-transmitter floating in a buoy a few miles away. A measure of the phase relationships of the radio signals yields the distance traveled by the ship toward the buoy in a given length of time.

Science News Letter, December 6, 1952

INVENTION

Patent Process for Cleaning Dirty Eggs

► SO-CALLED "heavy dirty" eggs can be cleaned by a process which subjects them, as one important step, to a spray of water at the boiling point for a very few seconds. The process was invented by Harry A. Mulvany, Berkeley, Calif., for which he received patent 2,618,216.

"Heavy dirty" eggs, those with a great deal of dirt on the shell, must be cleaned before they find a market. The dirt helps along the rotting process as well. Mr. Mulvany first blasts his eggs with sand and water, then subjects them to a spray of boiling water for three seconds. This washes off the remaining sand and water and makes the shells sterile without bringing the albumen to the coagulating point.

The eggs are then coated with a sterile oil. Eggs treated in this manner, according to the inventor, shrink at a very much lower rate than untreated eggs, and may be held for a period of weeks without undue drying and without becoming so-called "rots."

Science News Letter, December 6, 1952

CHEMISTRY

Pure ACTH Isolated But Synthesis Remote

► ACTH, the pituitary gland hormone which stimulates the adrenal gland to produce cortisone and, like cortisone, is famous for bringing relief in arthritis, asthma and other diseases, has been isolated in pure form by researchers at Armour Laboratories in Chicago.

This pure ACTH is a white powder, soluble in water, and with a molecular weight of about 3,500, much less than originally estimated. It is a protein consisting, apparently, of a single chain of amino acids.

There is little chance, however, of synthesizing it, F. W. Specht, president of Armour and Company, said. The pure ACTH will be available only for research.

Science News Letter, December 6, 1952

IN SCIENCE

ENGINEERING

Robot Machines Cut Waste in Production

► AUTOMATIC MACHINES that watch the products they make are becoming a necessity today in plants that must maintain tight quality standards, H. L. Waddell, editor of *Factory Management and Maintenance*, told the American Society of Mechanical Engineers meeting in New York.

The machines do not pay for themselves solely by eliminating a worker or several workers, he said, but rather by cutting down waste. The cost of the extra equipment needed to produce 10 units to give five acceptable units is eliminated. The cost of reworking or scrapping unacceptable units also is slashed.

Mr. Waddell said he did not think that increased use of automatic machines would bring about grave problems of unemployment.

"If ultimate automation of every major factory were to arrive in a short span of time," he said, "the dislocations would certainly be serious. But it's obvious that ultimate automation will not take place in every company on the same day—or the same year. So I have every confidence that the 'economic feedback control' within our competitive system will prevent major dislocations."

Science News Letter, December 6, 1952

BIOCHEMISTRY

Ion Exchange Resins Speed Medical Advances

► BLOOD PLASMA can be made safe for transfusion, antibodies against disease germs can be purified, high blood pressure patients can be helped and stomach acidity can be determined without the need for swallowing a stomach tube.

All these medical advances are possible through the use of ion exchange resins which can take the salt out of sea water or hold back the salt and take out organic material.

How the ion exchange resins can be used for these various medical purposes was reported at a New York Academy of Sciences conference in New York. Reporting were the following scientists: Dr. Henry C. Isliker of Harvard University; Drs. K. G. Kohlstaedt, B. L. Martz, R. S. Griffith and O. M. Helmer of the Lilly Laboratory, Indianapolis, Ind., and Dr. Harry L. Segal of the University of Rochester, N. Y., School of Medicine and Dentistry.

Science News Letter, December 6, 1952

SCIENCE FIELDS

GENERAL SCIENCE

Foundation Grants Aided Nobel Research

► THIS YEAR'S Nobel award in physics has increased to eight the number of Americans who have both become Nobelists and received Research Corporation grants to help conduct the researches that won the Nobel prizes.

Dr. Felix Bloch of Stanford University and Dr. Edward M. Purcell of Harvard University both received a series of Research Corporation grants, beginning in 1946, for their independent studies on the measurement of magnetic fields in atomic nuclei which won for them jointly this year's physics prize.

Other Nobelists who received financial support from the foundation resulting from the late Dr. F. G. Cottrell's electrical precipitation patents are: Dr. Harold C. Urey, chemistry, 1934; Dr. Ernest O. Lawrence, physics, 1939; Dr. Isidor I. Rabi, physics, 1944; Dr. Percy W. Bridgman, physics, 1946; Dr. Edward C. Kendall, medicine, 1950; and Dr. Edward M. McMillan, chemistry, 1951.

Science News Letter, December 6, 1952

HYGIENE

Window Sill Dust Is Not Black Smoke

► DO NOT judge a smoke stack by the smoke you see coming from it. The chances are that such smoke, thick as it may look, is not what makes dust fall on your window sill.

This advice, in effect, was given by W. C. L. Hemeon, engineering director of the Industrial Hygiene Foundation, Mellon Institute, at the Foundation's annual meeting in Pittsburgh.

Scientific methods must be used to determine whether or not a given stack is polluting the air and soiling homes, shops and other buildings in the neighborhood, Mr. Hemeon declared.

Fine particles, from improper burning of coal or other fuels, are the ones you see as they leave the chimney. They can be seen because of the light scattering power characteristic of all very fine particles. These fine particles are responsible for visible haze over a city. As they are slowly and imperceptibly deposited on ceilings and walls, they gradually stain these surfaces. The stain will be black if the particles are from coal smoke.

But the coarse particles that settle fairly fast on porches, sills and other outside objects are practically invisible when they come out of the chimney. They cause the

nuisance called "dust fall," but do not add to the visible haze over a city.

In most cities where a coal-smoke wall-staining problem exists, it is caused by smoke from domestic furnaces, Mr. Hemeon said. This is clear from the fact that it is almost completely absent in summer.

Dust fall nuisances, on the other hand, almost always come from industrial operations. Technological improvements, Mr. Hemeon said, have had far greater effect in reducing air pollution than laws. Among such improvements he listed diesel engines instead of steam locomotives, and improved combustion equipment in factories.

Science News Letter, December 6, 1952

INVENTION

Rocket Pictures To Aid Research

► A WAY of taking continuous pictures of a high speed, experimental rocket, moving along a track, without moving the camera has been invented.

Previous difficulty has been that the track is too long to get the entire trip of the rocket onto film without "panning" the camera. At such high speeds, this is hard to do. Nevertheless, pictures are important in research work on rockets.

Dick R. Herman, Los Angeles, Calif., has invented a way of taking care of this. He has assigned his patent, number 2,618,195, to Northrop Aircraft, Inc., Hawthorne, Calif.

His camera views a bank of mirrors placed one above the other in the picture frame and independently adjusted so that a different portion of the rocket's track is seen in each mirror. In one particular set-up, the camera took constant pictures of the passage of a rocket along a track 1,850 feet long, using nine mirrors aimed at nine sections of the track.

Science News Letter, December 6, 1952

CHEMISTRY

Large Scale Production Of Rare Earths Possible

► LARGE-SCALE PRODUCTION of pure rare earths, 15 hard-to-separate metallic elements, is promised through the development of a new extraction method at the Argonne National Laboratory, Lemont, Ill.

The purity of the final product is not as great as by the ion exchange method, but the new process works much faster. The extraction method depends upon careful control of the strength and amounts of nitric acid and tributyl phosphate used.

A combination of the solvent extraction method and the ion exchange method would produce, for the first time, large quantities of high-purity rare earth elements, Dr. D. F. Peppard of the laboratory suggests. Co-workers in development of the new method were J. P. Faris, P. R. Gray and G. W. Mason.

Science News Letter, December 6, 1952

INVENTION

To Which Station Is Your Radio Tuned?

► A. C. NIELSEN CO., Chicago, one of the concerns which provides ratings of radio and television programs to sponsors and advertising agencies, can find out what station you are tuned to without calling you on the telephone. This can be done with an invention patented by Serge A. Scherbatskoy, Tulsa, Okla., and assigned to the Nielsen Company. Its number is 2,618,743.

There is a local oscillator in all super-heterodyne receiving sets. This oscillator puts out a signal the frequency of which changes as the set is tuned to different stations. This signal must be effectively shielded so that it does not interfere with other radio sets in the area.

The new gadget draws off a very small part of the local oscillator's signal and translates it into a signal which modulates at ultra-high frequencies. This signal is strong enough to be picked up at a central station several miles away.

The device which does this will be very small, having only one or two tubes, so that it can fit into the back of a typical radio cabinet. At the central station a receiver and a recording device are provided. Because the signal has been transferred into the ultra-high frequencies, the inventor says that it will be possible to receive permission from the Federal Communications Commission for its use.

Science News Letter, December 6, 1952

ENTOMOLOGY

Insecticide Causes High Birth Rate—in Flies

► FRUIT FLIES that survive exposure to a poison 240 times as deadly as DDT have an unusually high birth rate, partly making up for the toll of insecticides on the population.

This was reported by Dr. Herbert Knutson, zoologist at the University of Rhode Island, Kingston, following experiments to learn how insecticides affect insects through many generations. Dr. Knutson had noted that often, after use of insect sprays, the number of insects dropped rapidly for a while but came back greater than ever a few generations later.

He placed pairs of fruit flies that had survived exposure to dieldrin, a powerful poison, in rearing cages, then set up equal numbers of unexposed pairs in cages to act as controls. All eggs laid during the lifetime of both groups were counted.

Dr. Knutson found that dieldrin survivors laid five percent more eggs than the unexposed flies.

That five percent means a lot of flies, when you consider that a normal pair can produce 136,000 offspring in two generations, and there are 14 generations in a single season.

Science News Letter, December 6, 1952

PSYCHOLOGY

Your Eyes Fool You

Things are not always what they seem. Parallel lines appear to bend. Twin circles seem to be different sizes. People sometimes have trouble walking on an even floor.

See Front Cover

By MARTHA G. MORROW

► THINGS ARE not always what they seem. Your mind cannot always believe and trust what your eyes seem to see. Flying saucers are but one of the many sights that puzzle us.

An inch is a standard of length. Yet one inch can be made to look longer than another. To test this, draw a line exactly an inch long on a sheet of paper. At the middle of this line, extend upward and perpendicular to it another line exactly an inch in length. Do the two lines appear equal? Ask friends to spot the longer one and they will invariably point to the upright line.

Twin circles seem to be of a different size when one is surrounded by a dozen or so tiny dots, and the other has only four or five large circles around it. Parallel lines seem to bend when crossed by lines radiating from a nearby point.

Simplified drawings of an open book or stairs will seem to shift before your eyes. Look fixedly at them for a time, then blink or concentrate on another section of the figure, and they begin to shift back and forth. These are just a few of the optical illusions we come across in our daily lives.

Warped Mirror for Fun

If you have tried on a friend's glasses recently, you probably noticed how the lenses distorted objects seen through them. If they happen to be greatly warped lenses, they can make the walls of a room appear uneven, and a bookcase slope so drastically you wonder why the books do not slide off. They can even make water appear to flow uphill. Warped mirrors in "fun houses" seem to make you grow or shrink as you stare first in one and then in another. Others are designed to make you look deformed.

Even without mirrors or glasses, however, we often fail to see things exactly as they are or as they are related to each other. Only part of what we perceive comes through the senses from the object, the rest is "read into" it by our minds in the light of previous experiences.

Our minds are largely responsible for our illusions. Our past experiences, associations, desires and imaginings create illusions. Many illusions are caused by errors in judgment.

You, I and everyone else are in the habit

of assuming things as normal. Because we are used to rooms with untilted floors and walls of uniform height perpendicular to the floor and ceiling, a slightly warped room may look normal. But this same distorted room may make the people and objects in it look out of proportion, and make the laws of gravity seem to be misbehaving.

Several tilted rooms have been built throughout the country as tourist attractions. Screams and wild laughter emerge from these rooms as people struggle to make their way across the sloping floor. Yet a guide, more accustomed to the crazy angle of the room, can walk up one of the walls if the room is tilted far enough.

Part of Scientific Project

Another kind of distorted room, with uneven walls and a sloping ceiling, makes you appear to grow larger or smaller as you cross the level floor. It is the room that is distorted, but in such a clever manner that it is you who appear out of proportion.

This particular type of distorted room was not built for fun, but as part of a serious scientific project. Designed by professors at the Institute for Associated Research at Hanover, N. H., it is helping psychologists understand why we are so easily fooled by what we think we see.

A miniature model of this distorted room was designed at the institute specially for THINGS of science, published by SCIENCE SERVICE. Easily assembled at home, it demonstrates how easily your eyes trick you.

The pattern, to be backed with cardboard and folded into shape, resembles a doll's house when assembled. But what a lopsided house it is, with one wall twice as large as the wall opposite. Windows are varying sizes and shapes, large and small, rectangular and trapezoidal. But the tiny room has been so perfectly designed that it looks quite normal when you peep into it.

Place twin dolls against the distorted windows, however, and the one near the smaller window appears to tower over its duplicate, as shown on the cover of this week's SCIENCE NEWS LETTER. Cut out the windows and place one doll behind each, then the face of one doll will seem to be much larger than that of the other. Your thumbs, when seen through the windows, will appear unmated.

Another object designed at the institute to fool you is the so-called "rotating win-

dow." This window frame is trapezoidal in shape so that even when facing you squarely, it appears at an angle. When slowly rotated in front of you, it seems to swing from side to side.

Intriguing to watch and fun to experiment with, these various devices and rooms help psychologists discover how much of what we see is contributed by our eyes and how much is due to interpretation by our mind based on past experiences.

Psychologists Study Reactions

A wide variety of demonstrations, including some of those mentioned above, is on exhibit at Princeton University, Ohio State University and Dartmouth College. Here psychologists study the reactions of students and other visitors.

The scientists find that the nature of what is perceived is not necessarily a true reflection of the existing physical environment. It is only an interpretation based upon all the previous experiences the observer has had. The actual physical object may not be at all as you "see" it.

The demonstrations show strikingly that there is more to behavior than just your reaction to your immediate environment. At any moment, you must bring to bear all of your past experiences in sizing up what you see, and act accordingly.

A number of optical illusions or materials for creating them have been collected for you by Science Service. Fourteen misleading drawings, twin figures that look different, several shifting designs, pattern of a miniature distorted room, warped lens and trapezoidal window cutout are included in a kit, complete with suggested experiments, which you can secure for 75 cents or three kits for \$1.50. Write Science Service, 1719 N St., N. W., Washington 6, D. C., and ask for the Optical Illusion kit.

Science News Letter, December 6, 1952

INVENTION

Patent Device To Lock Too-Stuffed Auto Trunk

► WHEN YOU stuff the back trunk of your car so the lid will not close, an invention by Walter D. Gardels, Kansas City, Mo., will enable you still to lock the trunk. Hook elements, at each end of a strong bar, are shaped to fit the locking portions of the trunk lid and the body of the car, and can thus be locked into position. Different kinds of hooks must be made for different models of cars. Patent number is 2,618,497.

Science News Letter, December 6, 1952

More *menhaden* are caught in the United States each year than any other fish; they are used principally as fertilizer and as source of oil needed by the leather, steel and linoleum industries.



WALNUT SHELLS CLEAN—Walnut shells are now replacing sand or other materials likely to pit aluminum at The Firestone Tire and Rubber Company, Akron, Ohio. Using a vacuum tube, Chester Kanecke is drawing finely ground English walnut shells into the machine he uses to clean aluminum tire molds.

MEDICINE

Warn of Persistent Sore

► IF A sore in the mouth lasts three or four weeks without healing, a doctor should be consulted without further delay. The sore may be cancer, warns the American Medical Association.

Cancer within the mouth accounts for approximately eight percent of all human malignant diseases, according to Dr. James W. Hendrick, San Antonio, and Dr. Grant E. Ward, Baltimore. The greatest incidence of such cancers is between the ages of 50 and 60 years, with men being affected five times as often as women.

Because of their accessibility, such cancers should be diagnosed early and adequate treatment instituted, the doctors stated in a report to the *Journal of the American Medical Association* (Nov. 15). However, the larger percentage, when seen by the tumor specialist, are advanced cases.

Because cancers within the mouth frequently spread to other parts of the body, it is essential not only to eradicate the primary sore, but also to eradicate the involved lymph nodes, which transmit the cancer to other parts of the body, the doctors pointed out.

Microscopic examination of a specimen of the mouth lesion should be made when persistent sores prevail, they stated. The choice of treatment depends upon the location of the tumor, its size, its extent, the

type, the age and general physical condition of the patient, and the lymph node involvement.

These cancers may be treated with irradiation by X-rays or radium, electro-surgery, surgery, or by any combination.

Science News Letter, December 6, 1952

RADIOLOGY

More Patients Saved By High Voltage X-Ray

► MORE WOMEN are being saved from cancer death, thanks to the use of very high voltage X-rays. Evidence for this is reported by Dr. Traian Leucutia of Detroit in the *American Journal of Roentgenology, Radium Therapy and Nuclear Medicine* (Nov.).

The five-year-survival rate during the years 1924 to 1932 was 45%, Dr. Leucutia found from reviewing Harper Hospital, Detroit, records.

The survival rate from 1937 to 1945, when very high voltage X-ray treatment was used, was 60%.

Science News Letter, December 6, 1952

The speed at which a pilot parachutes to ground partly depends upon how easily air flows through the parachute's fabric.

PHYSIOLOGY

Tiny Beads Help Study of Heart Failure

► HEART FAILURE, man's biggest killer, is being studied by scientists at the University of California at Los Angeles by means of tiny, colored, radioactive beads.

Injected into the arteries of experimental animals, the beads stimulate a certain kind of blood clot, resulting in a condition almost identical with that of human heart failure.

It was found in the study that only a certain size of bead produces this condition, and that the beads always lodge in a certain part of the blood vessels in the heart.

This led the investigators to believe that a mechanism exists in this particular portion of the blood vessels which only a certain size of bead will trigger. When this mechanism, perhaps a nerve, is triggered, it may cause dilation of blood vessels in other parts of the body, resulting in the sudden drop of blood pressure characteristic of shock.

Members of the research team that developed the new technique are Dr. Clarence Agress, Dr. William G. Clark, Dr. Max Binder, Dr. Martin Rosenberg, Dr. Abraham Schneiderman and Howard Jacobs.

Science News Letter, December 6, 1952

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Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. books in print, send a remittance to cover retail price (postage will be paid in U. S.) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ADF RADIO COMPASS STATIONS: A Concise and Convenient Guide to More than 2500 Radio Stations Throughout the U. S. Suitable for Automatic Direction Finding—Lear, 36 p., paper, \$1.00. For the airplane owner.

ANNOTATED BIBLIOGRAPHY OF VITAMIN E, VOLUME II, 1950 and 1951—Philip L. Harris and Wilma Kujawski—National Vitamin Foundation, 106 p., paper, \$2.00. Contains 643 entries with author index.

THE CHEMICAL ELEMENTS—Helen Miles Davis, Ed.—Science Service, 160 p., \$2.00. This basic book brings up to the minute your knowledge of the chemical elements, old and new. Much is in the original words of the worker who made the discovery. (See p. 366.)

EXPLORATORY WELLS DRILLED OUTSIDE OF OIL AND GAS FIELDS IN CALIFORNIA TO DECEMBER 31, 1950—Gordon B. Oakeshott, Lewis T. Braun, Charles W. Jennings and Ruth Wells—California Division of Mines, Special Report 23, 77 p., paper, \$1.25. Contains an economic mineral map.

GAMBLING AMONG THE YAKIMA—Gerald R. Desmond—Catholic University of America Press, 58 p., illus., paper, 75 cents. A doctor's dissertation which tells of gambling among this

Indian tribe of Washington state. Popular were the bone game and horse racing, but although practically all adults gambled, no one got rich quick and no one suffered ruinous losses.

GEOLOGY OF BURRUEL RIDGE, NORTHWESTERN SANTA ANA MOUNTAINS, CALIFORNIA—James F. Richmond—California Division of Mines, Special Report 21, 16 p., illus., paper, 50 cents.

GEOLOGY OF LAS TRAMPAS RIDGE, BERKELEY HILLS, CALIFORNIA—Cornelius K. Ham—California Division of Mines, Special Report 22, 26 p., illus., paper, 75 cents.

GEOLOGY OF THE LEBEC QUADRANGLE, CALIFORNIA—John C. Crowell—California Division of Mines, Special Report 24, 23 p., illus., paper, 75 cents. Two of California's great faults, the San Andreas and the Garlock, cross the Lebec quadrangle and meet about a mile to the west.

GEOLOGY OF THE SOUTHERN RIDGE BASIN, LOS ANGELES COUNTY, CALIFORNIA—Peter Dehlinger—California Division of Mines, Special Report 26, 11 p., illus., paper, 50 cents.

GEOLOGY OF THE SUPERIOR TALC AREA, DEATH VALLEY, CALIFORNIA—Lauren A. Wright—California Division of Mines, Special Report 20, 22 p., illus., paper, 50 cents. One of the nation's important sources of talc.

GRANULAR ADSORBENTS FOR SUGAR REFINING: Some Factors Affecting Porosity and Activity in Service—Elliott P. Barrett, L. G. Joyner and P. P. Halenda—Mellon Institute, 7 p., paper, free upon request direct to the publisher, 4400 Fifth Ave., Pittsburgh 13, Pa.

HOW TO RESTORE AND DECORATE CHAIRS—Roberta Ray Blanchard—Barrows, 128 p., illus., \$4.95. Step-by-step instructions for a very pleasant hobby.

HUMAN PROBLEMS IN TECHNOLOGICAL CHANGE: A Casebook—Edward H. Spicer—Russell Sage Foundation, 301 p., \$4.00. In these days, many programs are devoted to bettering the lives of other people. If this is done blindly without awareness of the possible effects on the humans involved, disaster may result. This study in applied anthropology, intended to minimize the hazards, is based on actual experiences.

LEONARDO DA VINCI ON THE HUMAN BODY: The Anatomical, Physiological and Embryological Drawings of Leonardo da Vinci with Translations, Emendations and a Biographical Introduction—Charles D. O'Malley and J. B. de C. M. Saunders—Schuman, 506 p., illus., \$25.00. These drawings, reproduced here complete with Leonardo's notes in mirror writing, were done with the accuracy of a scientist and the rare skill of a great artist.

THE LEGEND OF THE NAHA STONE—Recorded in Hawaiian and translated by Stephen Desha—Hawaii Natural History Association, 12 p., illus., paper, 25 cents. The Naha Stone was

once the entrance pillar of the great temple Pinao.

MECHANICS: Lectures on Theoretical Physics Vol. 1—Arnold Sommerfeld, translated by Martin O. Stern—Academic Press, 289 p., illus., \$6.50. Here is written out the part on mechanics of the author's course on theoretical physics which he gave regularly for 32 years at the University of Munich.

NEW GAMES FOR 'TWEEN-AGERS—Allan A. Macfarlan—Association Press, 181 p., illus., \$3.00. First aid for parents in providing fun for rainy days or for children's parties. This up-to-the-minute book includes instructions for a game of flying saucers made to fly to "Mars," and rocket ships that go to the "moon."

PROCEEDINGS OF THE INDIANA ACADEMY OF SCIENCE, Volume 61, 1951—Alton A. Lindsey, Ed.—Indiana Academy of Science, 455 p., illus., paper, \$3.00. Research reports from various fields of science.

ROCKS AND STRUCTURE OF THE QUARTZ SPRING AREA, NORTHERN PANAMINT RANGE, CALIFORNIA—James F. McAllister—California Division of Mines, Special Report 25, 38 p., illus., paper, 75 cents. These bare mountains around Death Valley are a magnificent display of rocks from the pre-Cambrian to the Cenozoic.

SCIENCE CLUBS OF AMERICA SPONSOR HANDBOOK—Margaret E. Patterson, Ed.—Science Service, 1953 ed., 64 p., illus., paper, \$1.00. Aid in starting and operating a science club for students or adult hobbyists, how to conduct a Science Fair and how to compete in the National Science Talent Search.

SCIENCE MAGIC—Kenneth M. Swezey—McGraw-Hill, 182 p., illus., \$3.75. These "tricks," although amusing, are more than just entertainment—they explain many of the wonders of the modern world. You can perform the experiments yourself with simple articles from your kitchen or bathroom.

THE SULFAPYRIMIDINES: Sulfadiazine, Sulfamerazine, Sulfamethazine—Lawrence H. Sophian, David L. Piper and George H. Schneller—A. Colish, 180 p., free upon request to Lederle Laboratories, 30 Rockefeller Plaza, New York 20, N. Y. For physicians and others concerned with the nature of the new sulfa drugs and their use in treating infections.

THERMAL DIFFUSION IN GASES—K. E. Grew and T. L. Ibbs—Cambridge University Press, 143 p., illus., \$4.50. The study of thermal diffusion is one of the best means of investigating the nature of the forces exerted by one molecule on another. It is this aspect which is here treated most fully.

TRAILSIDE PLANTS OF HAWAII NATIONAL PARK—Douglass H. Hubbard and Vernon R. Bender, Jr.—Hawaii Natural History Association, 29 p., illus., paper, 25 cents. To help in identification, plants are shown photographed against inch-square cross-section paper.

VOLCANOES OF HAWAII NATIONAL PARK—Gordon A. MacDonald and Douglass H. Hubbard—Hawaii Natural History Association, 40 p., illus., paper, 50 cents. Kilauea and Mauna Loa are among the largest of the world's volcanic mountains and are among the most active. Yet they are easy and safe to visit.

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WHAT IS RACE?: Evidence From Scientists—Diana Tead—*UNESCO (Columbia University Press)*, 87 p., illus., paper, \$1.00. With ingenious diagrams and simple text, this booklet tells the story of human genetics and race. It is intended to give facts which will dispel blind race prejudice, but parts of the book are likely to lead to controversy and may offend the very readers the booklet is intended to influence.

THE WHOOPING CRANE—Robert Porter Allen—*National Audubon Society*, 246 p., illus., paper, \$3.00. The author literally lived with the cranes to collect the information here reported on their habits. "A whooping crane flock in migration," he says, "must be classed with the Grand Canyon and Yosemite among the Great Natural Wonders of North America."

WORKING WIVES AND MOTHERS—Stella B. Applebaum—*Public Affairs Committee*, 32 p., illus., paper, 25 cents. To help solve the modern wife's problem—to work or not to work, and giving suggestions on managing both household and job.

Science News Letter, December 6, 1952

DENTISTRY

Cleft Palate Problem

► **THE CHILD** with a cleft palate needs help as much as the child crippled by polio or disabled by any other cause, in the opinion of Dr. P. C. Lowery, dental surgeon in Detroit and president of the Pierre Fauchard Academy.

He calls for a central research unit in the U. S. Public Health Service to be devoted to this problem.

The cleft palate population is estimated at 200,000 with 4,600 new cases each year. Cleft palate is a condition in which the palate, or roof of the mouth, does not close through the center before the baby is born. As a result, the child born with this condition has trouble in chewing, swallowing and talking. Freak tooth arrangement may also result.

Surgical operations to correct the condition are not always successful, in Dr. Lowery's opinion. Patients may need to be fitted with an artificial palate. Dentists, he believes, can, from their experience in making false teeth, do much to aid the cleft palate victim.

In a report to *Dental Survey* (Dec.), he says a central research unit on cleft palates would have the following advantages: 1. a post-graduate school for cleft palate prosthesis; 2. improved efficiency and economy; 3. opportunity for the dentist to pool his skill with the plastic and maxillofacial surgeon, the sculptor, the artist, the engineer, the speech and voice instructor for re-education and correction; 4. the merging of inter-professional principles; 5. establishment of a special group to inquire and disseminate knowledge of a specific nature concerning a problem which dentists have been interested in and have contributed to for many years; 6. the complete rehabilitation of valuable and useful citizens.

BIOCHEMISTRY

Examine Catalase Role

► **A CLUE** to the mystery of the functioning of catalase, one of the important enzymes in plants and animals, has been suggested by a University of California at Los Angeles plant nutritionist.

Dr. David Appleman says that catalase may be a factor in the synthesis of two of the most prominent protein pigments in life processes—chlorophyll and hemoglobin.

"It seems significant that practically all catalase activity in the green plant cell and in the blood is localized in the chloroplast and the red blood cell, respectively," Dr. Appleman says. Chloroplasts are the center of chlorophyll synthesis, and hemoglobin is a major component of the red blood cell.

Dr. Appleman's research has revealed that when rapid chlorophyll synthesis takes place in the green plant cell, catalase activity decreases, and that when chlorophyll synthesis is blocked, catalase activity rises rapidly.

It has also been observed that catalase activity in livers of rats was decreased by pregnancy or a growing tumor, and that anemia often accompanied these conditions.

"Just what role the enzyme plays in the synthesis of the two major pigments of protoplasm is not yet known," Dr. Appleman says. "But the enzyme appears to bear a significant relationship to the green pigment which is so vital in energy-producing processes, and the red pigment so important to utilization of energy by animals."

Science News Letter, December 6, 1952

Engineers can reduce the hazard of coal-dust explosions from 70% to 90% in some mines by drilling holes in the coal beds and forcing water through the holes several days before the beds are mined.

FAMOUS ARISTO CALENDAR CHRONOGRAPH The Combination WATCH STOP-WATCH CALENDAR



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BIOCHEMISTRY

Drug Starts Gland Chain Reaction

► **A DRUG** which starts one of the body's gland chain reactions has been found. The drug is neostigmine, used in some disorders of muscles and nerves, such as myasthenia gravis.

It apparently stimulates the pituitary gland to cause a release of the female sex hormone from the ovaries, Dr. C. Frederic Fluhmann of Stanford University School of Medicine reported to the Pacific Coast Obstetrical and Gynecological Society.

His findings were made in experiments with immature female rats. He thinks, although further study is needed to be sure, that this same drug may also stimulate release of other hormones by other of the body's glands.

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Questions

CHEMISTRY—What is the molecular weight of pure ACTH? p. 360.

...

GENERAL SCIENCE—How can plants for producing power from atomic energy be financed? p. 356.

...

MEDICINE—How does the blood of multiple sclerosis victims differ from that of ordinary persons? p. 357.

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PHYSICS—What is the importance of the date Dec. 2, 1942? p. 358.

...

PHYSIOLOGY—How do tiny beads help in the study of heart failure? p. 363.

...

PSYCHOLOGY—What is the "not quite" age? p. 356.

How can the shape of physical objects appear to be changed? p. 362.

...

Photographs: Cover, p. 357, Fremont Davis; p. 355, Cranbrook Institute of Science; p. 359, Libbey-Owens-Ford Glass Co.; p. 363, Firestone Tire and Rubber Co.; p. 368, Spicer-Ette Co.

GEOLOGY

Atlantic Fishing Banks Once Part of Continent

► THE OFFSHORE banks of New England, Nova Scotia and Newfoundland, famous for their rich fisheries, were once a part of the continental land mass, Dr. Frank Press and Walter Beckmann, Columbia University geologists, told the Geological Society of America meeting in Boston.

The geologists said that seismic refraction measurements showed these banks are covered by as much as a two-mile deep layer of continental shelf sediments, indicating they once extended to the shore.

The deep rift valleys that separate the banks from the continental shelf were probably caused by erosion, they said.

Science News Letter, December 6, 1952

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CHEMISTRY

Only 98 Kinds of Matter

If neutron, atomic bomb trigger, is considered as element 0, however, then number of kinds of matter goes to 99, many of which have been isolated only recently.

► THERE ARE only 98 kinds of matter in the universe, and everything is composed of these fundamental building blocks.

A new SCIENCE SERVICE publication, written by Helen Miles Davis, editor of CHEMISTRY magazine, explains that some of these have been created by man for a very momentary existence, but others like hydrogen and helium seem to hold a very stable majority in the universe. (See p. 364.)

If the neutron, the atomic bomb trigger, is considered element 0, as is sometimes the case, then there are 99 elements.

Some of these elements have been found or created in only the few years after the great atomic energy push. There are hundreds of varieties of these elements, isotopes they are called, many artificially radioactive and not found in nature.

The story of the kinds of atoms, 0 to 98, has been long in composition, with many minds and hands putting it together. The ancients knew and recognized some of the elements, such as gold, silver, copper, etc., found in their native state. Others, even some of the most common, long remained hidden, in disguise of some other element or in the crudeness of early chemistry.

An outline of the elements is needed by anyone who attempts to work with them or understand them. This story is unfinished, although it is more nearly complete today than in the recent past. The blank holes in the periodic table are filled. There is not too great hope that chemists will add to the elements beyond 98 with the speed, precision and practicality that the dawn of our atomic age added neptunium, plutonium, americium, curium, berkelium and californium.

The present frontier of the chemical elements lies in the mystery of what composes them. Just what more fundamental particles make them up and what laws and forces keep their nuclei together is the prime question of physical science. Scientists are trying to pry loose the answer with cosmic rays and gigantic accelerators.

The chemistry of the elements has some blank pages to be filled and some figures to change in the future. To give individuality to the many names in today's list of elements, and provide a guide to the varied literature about them, is the purpose of this introduction to the chemical elements.

Science News Letter, December 6, 1952

BIOCHEMISTRY

Swift Cyanide Antidote

► ONE FORM of the anti-anemia vitamin B-12 acts as a swift antidote to cyanide poisoning, at least in mice, four scientists at the Merck Institute, Rahway, N. J., have discovered.

Mice "apparently dead" of cyanide poisoning, that is, mice that showed no signs of breathing and did not respond to handling, reacted "dramatically" when the vitamin was injected. They often began to breathe even before the entire dose was given, and many were able to walk immediately after the injection.

The vitamin was given by injection into the veins. It was effective in saving the mice when given as long as four minutes after an otherwise deadly dose of potassium cyanide. It was not effective when given as long as six or eight minutes after the poison.

Vitamin B-12 itself is not effective, but vitamin B-12a does act as an antidote to cyanide. B-12a is, chemically, hydroxocobalamin. B-12 is cyano-cobalamin. B-12a picks up cyanide ions to replace its hydroxo group, and binds the cyanide tightly. In doing this, it becomes vitamin B-12, but

also removes the deadly cyanide from the body. It can also prevent cyanide poisoning when given before the cyanide.

Merck scientists who announce this discovery are Charles W. Mushett, Kane L. Kelley, George E. Boxer and James C. Rickards. Their findings are reported in the *Proceedings of the Society for Experimental Biology and Medicine* (Oct.).

Science News Letter, December 6, 1952

PHYSIOLOGY

Different Pains Follow Same Paths to Brain

► THE TWO kinds of pain, both the pricking kind and the kind that is burning and never lets up, follow the same nerve pathways to the brain.

This finding, important to surgeons when they try to stop intractable pain by blocking or cutting nerve pathways, was reported by Drs. Henry G. Schwartz and James L. O'Leary of Washington University School of Medicine, St. Louis, at the meeting of the National Academy of Sciences there.

Science News Letter, December 6, 1952

• RADIO

Saturday, Dec. 13, 1952, 3:15-3:30 p.m., EST
"Adventures in Science" with Watson Davis,
director of Science Service, over the CBS Radio
Network. Check your local CBS station.

Dr. G. Robert Coatney of the National Institutes of Health, Bethesda, Md., discusses "The Conquest of Malaria."

AGRICULTURE

Two Billion Dollars Invested in Irrigation

► TWENTY-FIVE MILLION acres of American soil are now under irrigation, served by canals that would stretch five and a half times around the globe, Ivan D. Wood, U. S. Department of Agriculture, reported to the American Society of Agricultural Engineers.

The Federal government alone has invested \$2 billion in irrigation projects, roughly the amount spent to create the A-bomb, Mr. Wood said. Gross returns so far from crops grown on irrigated land are over seven times this amount, he said, amounting to more than half a billion dollars in 1950 alone.

Irrigated land now furnishes nearly all our domestic supply of apricots, almonds, dates, figs, prunes, and olives, he said. Other important irrigation crops are: lettuce, 90%; sweet cherries, 85%; avocados, pears and cantaloupes, 75%; asparagus, 65%; peaches and truck crops, 50%.

Science News Letter, December 6, 1952

PSYCHOLOGY

"All-Tied-up" Feeling

► WHAT CAUSES that "all-tied-up" feeling when you frown, grit your teeth, clench your fists and feel tense all over?

That is what Dr. Robert Voas, University of California at Los Angeles psychologist, is trying to find out.

His study concerns how tension is reflected in electrical activity in seven muscles. They are the frontalis (brow muscle), masseter (a jaw muscle), trapezius (back of the neck muscle), two forearm and two leg muscles.

Muscle electrical activity is measured by delicate instruments while subjects are exposed to varying situations in a prone position. One situation involved doing mental arithmetic. This was reflected in activity by the two forearm muscles—indicating a response conditioned by years of "figuring arithmetic" with pen or pencil.

Stress-frustration situations were induced by continuous, loud noises while subjects were doing mental arithmetic. These were reflected in some activity in all muscles but particularly in face (frontalis and masseter) muscles and to a lesser extent in the legs. This seemed indicative of how stress may involve frowning, gritting teeth and clenching fists.

MEDICINE

Smoke Gives Mice Cancer

Chances of getting cancer increased considerably for mice when they are exposed to cigarette smoke once an hour for a 12-hour day.

► HALF A lifetime of smoking a cigarette once every hour for a 12-hour day increases the chances of getting lung cancer by about one-third—for mice, that is, with a hereditary tendency to lung cancer.

This finding is from one of the very few experiments in which animals have been used to try to settle the controversy over whether tobacco smoke causes lung cancer. The experiment was made by Dr. J. M. Essenberg of the Chicago Medical School.

The only similar experiment known to him was made by Dr. Egon Lorenz of the National Cancer Institute in 1943. This showed no difference in lung cancers between mice that smoked and mice that did not, but the experiment did not run longer than 250 days. This, Dr. Essenberg thought, might not be long enough to show a difference.

The mice, of course, did not actually smoke the cigarettes. In Dr. Essenberg's experiment they were housed in a special cage with an especially designed automatic smoking machine. This machine had a rotary cigarette carriage holding 12 cigarettes. An automatic electrical cigarette

lighter connected to a program clock lighted a cigarette every hour for 12 hours. A vacuum pump created just enough suction to burn the cigarette and circulate fresh air.

Of 23 mice in this cage with the hourly cigarette smoke for one year, 21 developed lung cancer. Of 32 mice of the same strain, housed and fed the same but not "smoked," 19 developed cancer. The difference, 31.9%, is statistically significant. The probability of its occurring by chance is less than one in 100.

Besides getting more cancer, the smoked mice grew more slowly and failed "by a large margin" to reach the weight of the unsmoked controls. The smoked mice had no young, while the controls reproduced freely, Dr. Essenberg states in his report to *Science* (Nov. 21).

Science News Letter, December 6, 1952

NEW FREE BOOK for the HARD of HEARING

Do you now have trouble understanding folks whom you used to hear clearly? Does one ear hear better than the other? Is it hard to hear the difference between fifteen and fifty—then and ten—and life and knife or other sound-alike words?

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❁ **"STEREOSCOPIC" SCREEN** is especially designed to help the amateur project with full effect the breath-taking scenes captured by his three-dimensional camera. Easily set up, the portable, roll-up screen has a ratchet device that adjusts tension on the aluminum-treated surface to get rid of undesirable wrinkles.

Science News Letter, December 6, 1952

❁ **VARNISH REMOVER**, previously available only in industrial sizes, now can be obtained in pint, quart and gallon cans for home use. Applied to varnish- and paint-covered woods, the solution decomposes the varnish and paint yet does not harm the wood.

Science News Letter, December 6, 1952

❁ **EXPERIMENTAL ANTENNA** for automobile radio transmitters also doubles as a fishing rod when the motorist wants to commune with nature. Made of shatter-proof flexible glass with the usual fishing rod line-guides, the antenna's internal braid conductor has been found a good radio-wave radiator. Antenna not yet available commercially.

Science News Letter, December 6, 1952

❁ **SPICE DISPENSER**, shown in the illustration, has six removable chambers made of a clear plastic in which different powdered or granulated spices can be stored.



By turning the movable, brightly colored cap on the unit, the housewife selects the desired spice. The cap can be adjusted to sprinkle or to pour the spice.

Science News Letter, December 6, 1952

❁ **WIRES AND CABLES** for high-temperature applications have silver-plated copper conductors, available with chemical-resisting insulation in 14 colors. Tempera-

tures from minus 55 to plus 200 degrees Centigrade do not cause the insulation to become brittle or soft.

Science News Letter, December 6, 1952

❁ **GAS WATER HEATER** provides households with hot water at two temperatures, 180 degrees and 125 degrees Fahrenheit. The 180-degree water is piped to automatic clothes- and dish-washing machines, reaching the machines at a temperature that is satisfactory for killing bacteria. The 125-degree water goes to household faucets for general use.

Science News Letter, December 6, 1952

❁ **TEA-MAKER** consists of a glass pot in which water is heated. Tea leaves are put in a separate glass cylinder that is perforated at one end. The cylinder is "pumped" up and down in the pot while the tea is brewed, but is removed before the tea is served.

Science News Letter, December 6, 1952

❁ **ALKALINE RADIO** dry battery is nearly 25% smaller than present types, yet offers double life when used in small portable radios that have been designed especially for it. The alkaline-cell principle, heretofore applied only to wet-type, non-portable batteries, makes the battery more efficient, thus permitting its size to be smaller than ordinary "B" batteries.

Science News Letter, December 6, 1952

• Nature Ramblings •

➤ **AMBITIOUS DREAMERS** of human flight, from Leonardo da Vinci to the Wright brothers, studied closely the flight of birds, and at long last profited thereby.

A modern airplane is like a bird at least to the extent of putting a streamlined covering over the irregular surfaces of its power sources, as a bird streamlines its rather awkward-looking body with smooth feathers.

Some of our newer high-speed planes seem to have been modeled on the lines of a hawk-moth rather than those of a bird. They have the same fineness of fuselage, the same trim and taper wings as those hovering, long-tongued twilight visitants to summer flower-gardens.

However, if an airplane designer were able not only to copy the hawk-moth's smooth lines, but to imitate even a part of the things a hawk-moth can do in flight, he would have trouble taking home all

Still Unimitated



the medals and prizes that would be heaped on him.

The hawk-moth is not only capable of swift, darting forward flight; it can fly backwards, dodge sidewise, stop abruptly in mid-flight and hover motionless in the air. It can rise or drop abruptly while hovering, swoop with equal abruptness while in flight. In all these marvelous

skills it closely resembles the hummingbird, for which it is sometimes mistaken by those who are not close observers.

Add to this the fact that this insect's wonder-wings are also its only propellers!

It is only lately that scientists have been able to get an adequate idea of how an insect uses its wings in flight. Close watchers with good eyes were able to catch the principal movements of the bird's wings: Leonardo's notebooks are full of sketches showing how carefully he watched the birds he strove to imitate.

But the many-fold more rapid beats of an insect's wings defied study until the recent invention of ultra-high-speed motion picture cameras capable of making thousands of exposures a second. Now we know how an insect flies—but, despite all our scientific and technological advances, we are still unable to imitate its art.

Science News Letter, December 6, 1952